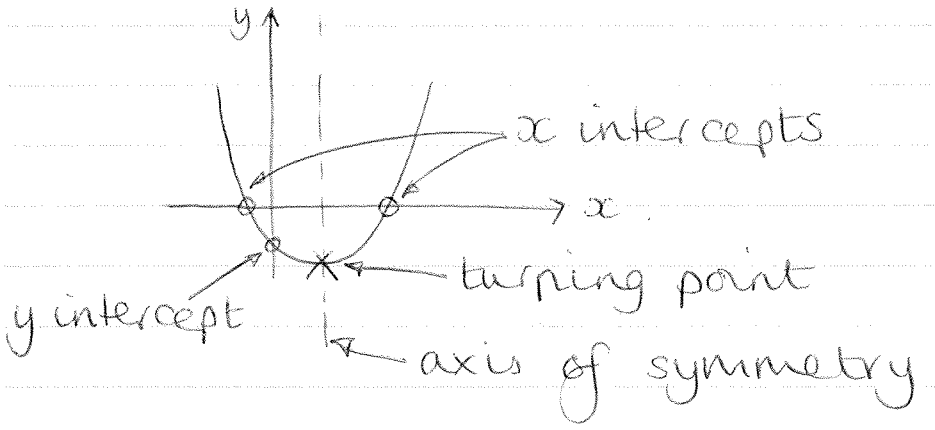
Sketching quadratic graphs (parabolas)



To be able to sketch a graph you need the y intercept, x intercept(s) - if any, axis of symmetry and turning point. Also if you have $-x^2$ then it is a max ∩ and $+x^2$, then it is a min U.

Using $y = x^2 - 5x + 6$ → gives U min

① y intercept $(x = 0)$ $y = 0^2 - 5 \times 0 + 6$
$= +6$

② x intercepts $(y = 0)$ use zeros $(x^2 - 5x + 6, x)$
$\{2, 3\}$

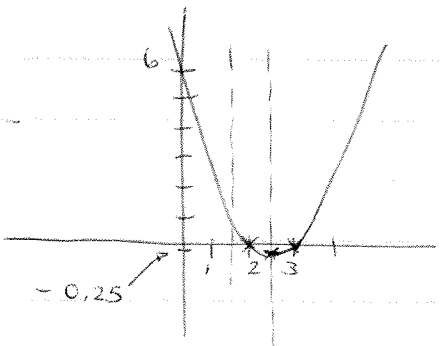
③ axis of symmetry - half way point between the two x intercepts $= \frac{2+3}{2} = \frac{5}{2} = 2.5$
$x = 2.5$

④ turning point - substitute $x = 2.5$ into equation
eg $y = (2.5)^2 - 5 \times 2.5 + 6$
$= -0.25$
tp $= (2.5, -0.25)$

OR Solve $(y = x^2 - 5x + 6, y) | x = 2.5$
$y = -0.25$ (gives same answer)

⑤ sketch graph using y intercept of 6
x intercepts of 2, 3
axis of symmetry $x = 2.5$
t.p. $(2.5, -0.25)$

sketch



Sometimes there is only 1 x intercept

eg $y = x^2 + 4x + 4$ → min ∪

① y intercept $(x=0)$ $y = 0^2 + 4\times 0 + 4$
$= 4$

② x intercept $(y=0)$ zeros (x^2+4x+4, x)
$\{-2\}$ (only 1 intercept)

③ axis of symmetry
- must be same as x-intercept $x = -2$

④ t.p. if only one intercept then this is the min (or max) of graph so it will be where $y=0$ t.p. $(-2,0)$
or substitute $x=-2$ into eqn

$y = (-2)^2 + 4\times -2 + 4$
$= 4 + -8 + 4$
$= 0.$

⑤ sketch y intercept 4
x intercept -2
axis of symmetry $x=-2$
t.p. $(-2,0)$